Comparative Evaluation of the Thermal Conductivity for Selected Materials Measured with a Laser Flash Apparatus and Other Techniques

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The thermal conductivity of a wide selection of materials was determined. The materials include:

- powder metallurgical steels with different porosity
- limestone from different origin and its yielded lime
- refractory materials: - low density materials for insulation purposes
  - high density materials for fire protection

Each material was measured with two measuring techniques, which were suitable for the specific material.

Systematic measurements of the thermal diffusivity were carried out with all materials by means of a laser apparatus up to a maximum temperature of 1500°C. In order to obtain the thermal conductivity, the required specific heat capacity was measured, as well as the thermal expansion. The resulting conductivity was compared with that directly obtained with a hot plate (steady state panel test method), a hot disk and a hot wire.

The evaluation of the accuracy of the methods will be structured and presented as follows:

- The same sample measured several times with the same measuring technique. The purpose is to show the accuracy of the method.
- The evaluation of each method with different samples in order to show the fluctuation of the conductivity inside the material.
- Finally, the deviation of the conductivity measurements among the different measurements techniques. Through this, it can be established if the difference of the results may be attributed to the characteristics of material.